2-2019

Mole Street Journal, February 2019

University of Arkansas, Fayetteville. Dept. of Chemistry and Biochemistry

UNIVERSITY OF ARKANSAS
J. WILLIAM FULBRIGHT COLLEGE OF ARTS & SCIENCES

The Mole Street Journal

Department of Chemistry and Biochemistry

Volume 18, Issue 1 February 2019

Special points of interest:

- Chen named Arkansas Research Alliance Fellow
- New graduate students
- Mills Lecture Series
- Sturgis International Fellowship Program taking applications
- Moradi research highlighted

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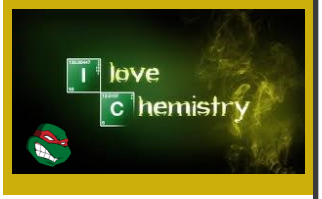


Chen Named Arkansas Research Alliance Fellow

~from the Newswire, December 14, 2018

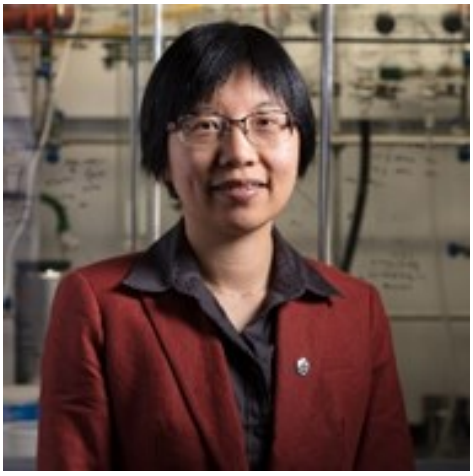


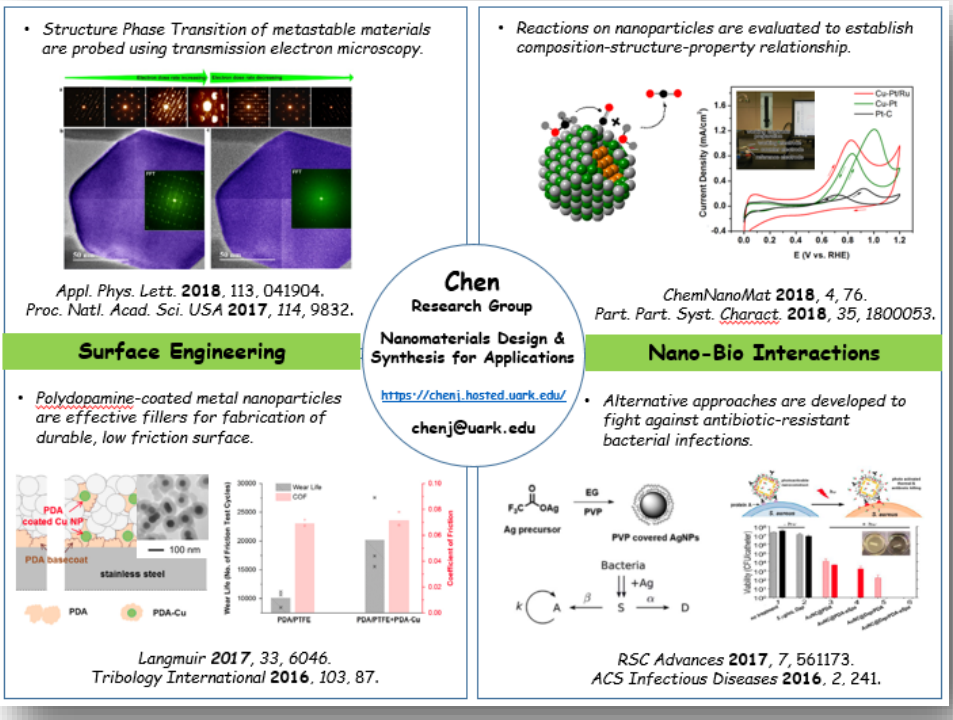
Photo courtesy of Russell Cothren, Univ. Relations

Jingyi Chen, associate professor of physical chemistry, has been named an Arkansas Research Alliance Fellow. The ARA Fellows program supports distinguished researchers currently working at one of the five research universities in the state with a $75,000 grant paid over three years. The program recognizes research leaders with an established history of impact.

Chen's research focuses on how the physical properties of macroscopic objects arise out of the component atoms as they aggregate into larger and larger particles. She is developing novel multi-metal-based nanostructures and new methods for functionalizing their surfaces with soft materials. The ultimate goal of her research is to establish the structure-property relationships and further explore their applications in energy conversion, tribology, and nanomedicine.

Chen joined the U of A in 2010. She received her doctorate from the University of Washington-Seattle, completed a postdoctoral fellowship at the Brookhaven National Laboratory in Upton, New York, and served as a research assistant professor at Washington University in St. Louis.

Past University of Arkansas ARA Fellows include Laurent Belliache, Distinguished Professor of physics; Min Zou, professor of mechanical engineering; and Alan Mantooth, Distinguished Professor of electrical engineering.



Faculty News

On the Go

Suresh Kumar Thallapuranam gave an invited oral presentation at the Annual PepTalk, organized by the Cambridge Health Institute in San Diego, CA, on Jan. 17-18. He served as the moderator and chairperson for the "Bioprocessing of Microbial-based Products" session at the conference.

Publications

Chen, S.; Wu, H.; Tao, J.; Xin, H.; Zhu, Y.; **Chen, J.** Pt-Ni Seed-Core-Frame Hierarchical Nanostructures and their Conversion to Nanoframes for Enhanced Methanol Electro-Oxidation, *Catalysts* 2019, In Press (invited paper).

Song, L.; Liang, Z.; Ma, Z.; Zhang, Y.; **Chen, J.**; Adzic, R.R.; Wang, J.X. Temperature-Dependent Kinetics and Reaction Mechanism of Ammonia Oxidation on Pt, Ir, and PtIr Alloy Catalysts, *J. Electrochem. Soc.* 2018, 165, 15, J3095-3100.

Li, J.; Sun, K.; Li, J.; Meng, Q.; Fu, X.; Yin, W.-G.; Lu, D.; Li, Y.; Babzien, M.; Fedurin, M.; Swinson, C.; Malone, R.; Palmer, M.; **Mathurin, L.; Manson, R.; Chen, J.;** Konik, R.M.; Cava, R.J.; Zhu, Y.; Tao, J. Probing the Pathway of an Ultrafast Structural Phase Transition to Illuminate the Transition Mechanism in Cu_2S, *Appl. Phys. Lett.* 2018, 113, 041904.

Chen, H.; Venkat, S.; Hudson, D.; Wang, T.; Gan, Q.; Fan, C. Site-specifically Studying Lysine Acetylation of Aminoacyl-tRNA Synthetases. *ACS Chem. Biol.* 2019, Accepted.

Abdolkarim Zare, Alireza Kohzadian, Zahra Abshirini, Seyed Sajad Sajadikhah, **Joshua Phipps**, Mourad Benamara, and **M. Hassan Beyzavi**. Nano-2-(dimethylamino)-*N*-(silica-*n*propyl)-*N*,*N*-dimethylethanaminium Chloride as a Novel Basic Catalyst for the Efficient Synthesis of Pyrido[2,3-d:6,5d']dipyrimidines. *New Journal of Chemistry*, 2019, Advance Article. DOI:10.1039/C8NJ04921A.

Kalyan Immadisetty, JeevapaniHettige, Mahmoud Moradi, Lipid-Dependent Alternating Access Mechanism of a Bacterial Multidrug ABC Exporter. *ACS Central Science, Article ASAP,* 2019. DOI:10.1021/acscentsci8b00480.

Honors and Awards

The Moradi Lab received an allocation on the special-purpose supercomputer, Anton 2, housed at the Pittsburgh Supercomputing Center. Fifty-seven research labs across the US have been awarded access to Anton 2 in this cycle.

The research led by Dr. **Hassan Beyzavi** is highlighted in SYNFACTS. Beyzavi and his co-workers, including Dr. **Jingyi Chen** and graduate student **John Ozdemir**, published their work in Advanced Synthesis & Catalysis (ASC) Journal (*Adv. Synth. Catal.* **2018**, *360*, 4372–4380) which is the leading primary journal in organic, organometallic, and applied chemistry. They reported a Magnetic Nanoparticle Anchored Deep Eutectic Solvent as a Catalyst for the Nucleophilic Substitution Reactions. (see below scheme for the discovered reaction details.)
SYNFACTS has chosen this work to highlight (Synfacts **2019**, *15*, 0182). In SYNFACTS, current research results in chemical synthesis from the primary literature are screened, selected, evaluated, summarized, and enriched with personal comments by experts in their fields on a monthly basis.
SYNFACTS addresses the needs of synthetic chemists in academia (including students) and industry by helping them to know, learn, and think more about their own field as well as neighboring disciplines. SYNFACTS stimulates the reader's research and the development of exciting new ideas. The journal is also aiming to support teaching and lecturing activities as well as examination preparation.

New Graduate Students for Spring 2019

Claire Beard (left) and **Jean Carlos Morales Orocu** (right) have joined the department as graduate students for the spring 2019 semester.

Claire, a native of Mulvane, KS, received her BS in December, 2018, from Oklahoma State University - Stillwater. She is in the doctoral program for chemistry.

Jean is from Panama. He received his BS in Chemistry from the University of Arkansas in the fall of 2018. He is in the doctoral program for MicroEP and is a member of the Heyes lab.

From the Chair ~ *Wesley Stites*

Unfortunately for us, Heidi Thompson left her position as the 'department accountant'. Not the official title, but Heidi kept our bills paid, helped get grad students and post-docs paid, billed for services rendered, and tracked money in what seems like a million different grant, scholarship, fellowship, indirect cost, teaching, and other miscellaneous accounts. Our loss is the University's gain, as she got a well-deserved promotion and will be working on the team transitioning the University from our current financial software (BASIS, now over 25 years old and showing it) to WorkDay, our a new "Enterprise Resource Planning" (ERP) package. While we are sad to see her go, I for one feel happier about the new software knowing that Heidi will be working on it.

Tim Tripp will be moving from his current position of administrative assistant into Heidi's position. I know that there still will be a learning curve, but he already has a running start, having worked closely with Heidi on personnel issues. And, yes, that means we now need to fill his former position…

Alumni Notes

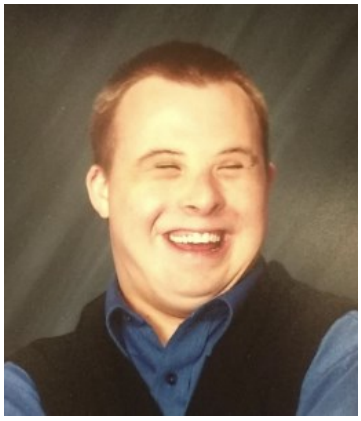
Yun-Ho Kim (PhD 2003) was promoted to full professor, beginning August 2019, at the University of West Alabama, Livingston, AL. Dr. Kim received his PhD from the UA in 2003 under **Wesley Stites**. He completed a Post doc at the Univ. of Iowa from 2003-2004. He worked as an assistant professor at Northeastern State Univ. 2004-2006, then joined the faculty of the University of West Alabama in 2006. Dr. Kim returns to Fayetteville every summer, where he teaches Organic Chemistry at the UA.

After finishing his B.S. in Chemistry at Lyon College (Batesville, AR.) in May of 2004, Dr. **Jason Martin** started his graduate career at the University of Arkansas in August. He joined the research group of Emeritus Professor Dr. **Peter Pulay**. Dr. Martin performed his research in experimental and theoretical explorations of titanium dioxide-based materials. He successfully defended his dissertation in February of 2009 and was officially granted a Ph.D. in Physical Chemistry in May.

Aside from the many hours devoted to being a graduate student, Dr. Martin also committed time to being a student leader at Chi Alpha Campus Ministries at the UofA under the direction of campus pastor Ronnie Hoover. While not taking a typical path after graduating with a Ph.D. in chemistry, Dr. Martin 'gave back' to this campus ministry for two years as a staff member/intern. During his time there, he also met his lovely wife Caysie.

Dr. Martin was a full-time staff member at two other Chi Alpha chapters in the states of Oklahoma and Virginia for a total of seven years of service as well as teaching lower and upper division chemistry, math, and physics courses as an adjunct professor on multiple campuses in Tulsa, OK. After transitioning out of the campus ministry life, Dr. Martin began to pursue full-time academic positions and accepted an offer in 2017 with National Park College in Hot Springs, AR as a chemistry faculty member. Dr. Martin, his wife, and two-year old daughter (Kaylee) love the Hot Springs area and ample opportunities afforded there for outdoor recreation.

Tribute to Patrick Hayes



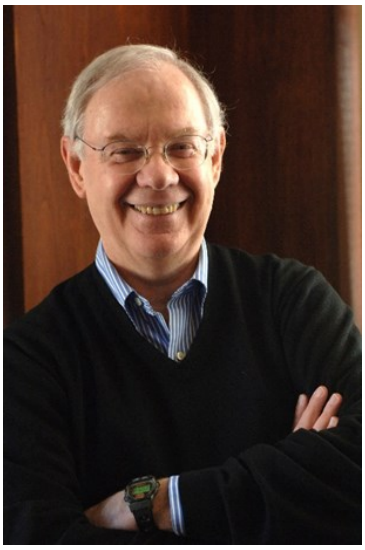
Patrick Lee Hayes

Patrick Lee Hayes, 34, of Fayetteville, died Friday, January 4, 2019. He was born March 25, 1984 in Mobile, Alabama to Robert David and Victoria Lynn Hayes.

Patrick loved music. He played drums, harmonica, keyboard, and guitar. He enjoyed going out to eat, shopping trips, and going to the movies. Patrick also enjoyed sports and was a huge Hog, Crimson Tide, and Dallas Cowboy fan. Above all, Patrick had a loving heart, tremendous faith in God, and always prayed for others. He truly loved life and never met a stranger.

Patrick was a friend to the department. Many will remember him helping his mother and father as they worked in what was then called the Science building. One of his favorite tasks was refilling the paper towel trays in all the labs. We are saddened by his passing, and our condolences go out to his parents.

Mills Lecture Series Welcomes Robert G. Griffin



The annual Mills Lecture Series presents Robert G. Griffin, BS 1964, as the featured speaker. Bob graduated with a BS (Honors) from the U of A in 1960 and did undergraduate research with Professor E.X. Amis on electrochemistry. He received his Ph.D. in 1969 from Washington University in St. Louis, MO, and did a post doc at MIT, completing in 1971.

He was awarded the 2017 RR Ernst Prize by the European Magnetic Resonance Conference (EUROMAR) in Warsaw, Poland. He is currently the director of the Francis Bitter Magnet Laboratory at MIT. See October 2017 Mole for more information. His talk is entitled, "Atomic Resolution Structures of Amyloid Fibrils: $TTR_{105-115}$, $A\beta_{1-42}$ and β_2-microglobulin.

He will be presenting his lecture February 25, 2019 in CHEM 144 at 3:30 p.m. with a reception following at 4:30 p.m. in CHEM 105.

Sturgis International Fellowship Program Open for Applications

The Fulbirght College Honors Program in the J. William Fulbright College of Arts and Sciences is once again accepting applications for the prestigious Sturgis International Fellowship. The deadline to submit is by 4 p.m. Friday, March 1.

This award, funded by a gift from the Roy and Christine Sturgis Educational Trust, grants up to 10 scholars per year $15,500 in support for longer-term research or internship-focused study abroad (defined as at least four continuous months outside of the United States).

The Sturgis International Fellowship builds on Sen. J. William Fulbright's mission of peace through education by encouraging scholarly collaborations between U of A students and scholars around the world.

Applicants must be rising junior or senior Fulbright College Honors undergraduates with a declared major in Fulbright College, or full-time graduate students pursuing a degree anchored in Fulbright College.

In 2018-19, seven students were selected to receive this prestigious international fellowship. These students' specialties range from political science, history and geography, to creative writing and chemistry.

Jazlynn Sikes is an analytical chemistry doctoral student in the Department of Chemistry and Biochemistry who is spending the spring 2019 semester at Rurh University in Bochum, Germany, studying the kinetics of silver nanoparticle oxidation in order to understand the impact of nanoparticles on environmental, atmospheric, and human health. The lab in which Sikes is working is one of a few places in the world where research on single-entity nanoparticles is conducted. She is a member of the **Fritsch** lab.

Jazlynn Sikes

Application guidelines and requirements are available on the Sturgis International Fellowship web page.

Final applications must be submitted in both hard-copy and PDF format. Hard copies must be delivered to the Fulbright College Honors Office in 517 Old Main and PDF files should be sent to Mary Ellen Hartford at mhartfo@uark.edu.
Students should have their letters of recommendation sent directly to Hartford.

All application materials are due in the Fulbright College Honors Office no later than Friday, March 1, by 4 p.m.

New Insight Into Cell Membranes Could Improve Drug Testing and Design

~from the Newswire, January 22, 2019

Research at the University of Arkansas on membrane proteins could lead to better development and testing of drugs. Chemistry researchers studied a type of membrane protein that expels drugs from a cell, contributing to drug resistance. They found that the lipid composition of the cell membrane has an effect on the behavior of these proteins, which should be taken into account when testing drugs that target membrane proteins. Their results are available open-access in the journal *ACS Central Science*.

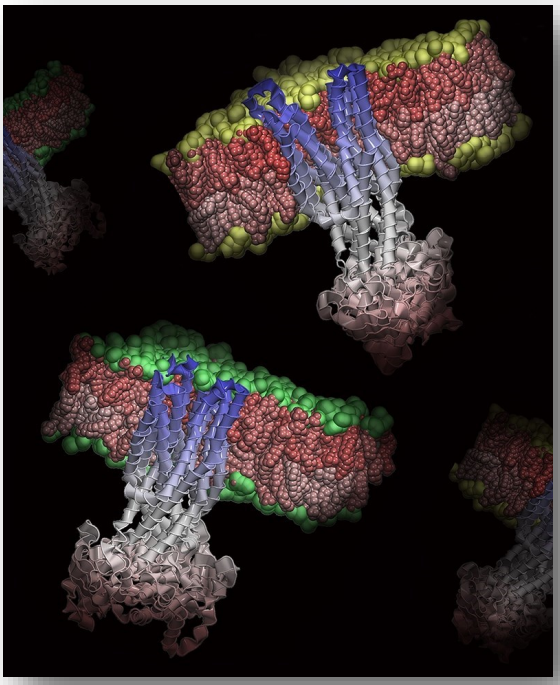
Drug resistance, including bacterial resistance to antibiotics and cancer cells' resistance to chemotherapy, is a significant challenge for drug developers.

"Almost two-thirds of all drugs target membrane proteins," explained **Mahmoud Moradi**, assistant professor of chemistry and biochemistry. "This research looks at how membrane proteins interact with the environment. If you ignore the fact that these proteins are dependent on their environment, you could end up with the wrong drugs."

Moradi and colleagues studied a type of membrane protein called multi-drug ABC exporters. These proteins transport substances, such as drugs, from the inside to the outside of cells, and they are responsible for both antibiotic resistance in bacteria and chemotherapy resistance in mammalian cells.

Using specially designed supercomputers supported by the National Science Foundation and the National Institutes of Health, the researchers performed molecular simulations to investigate how the lipid composition of a cell's membrane affects these proteins.

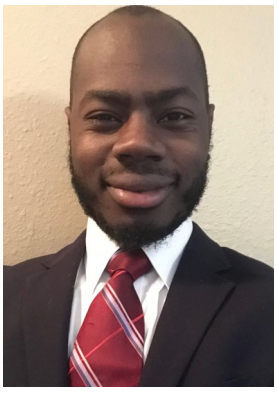
They found that these proteins remained inactive and didn't expel drugs in cell membranes with one type of lipid composition, called phosphocholine, or PC. However, the same proteins became active in cells with a different lipid composition, called phosphoethanolamine, or PE, allowing them to release drugs and making the cell resistant. Among the cell membranes composed of PE lipids, those containing one particular lipid type, called POPE, proved to be most effective in activating these proteins and thus most susceptible to drug resistance. Taking this information about the lipid environment into account could help researchers more effectively develop and test antibiotics and cancer treatments.



This image illustrates researchers' findings that the membrane proteins can be active, contributing to drug resistance, in cell membranes with one type of lipid composition (top), but inactive in membranes with a different lipid composition (bottom).

Students Defend, Pass Cumulative Exams

Abdullah Qassab



Christopher Ruth

Cody Canote

Abdulla Qassab defended his Cell and Molecular Biology dissertation, "The First In Vivo Human Methionine Sulfoxide Proteome and the Impact of Smoking" November 19, 2018. His advisor is Wesley Stites.

Christopher Ruth defended his Chemistry Master's Thesis, "Ca^{++}-induced Structural Change of Multi-domain Collagen Binding Segments of Collagenases ColG and ColH from *Hathewaya histolytica*" November 29, 2018. His advisor is Joshua Sakon.

Cody Canote successfully passed his 7th cume January 25, 2019. Cody entered the program in the fall of 2018. His advisor is Stefan Kilyanek.

THE MOLE STREET JOURNAL IS AN INTERNAL PUBLICATION OF THE DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY
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Safety Tip:

By Chris Mazzanti

Fume hoods are used for your safety. Remember that no loose paper should be in the hood, and that the alarms are there for a reason. If the alarm goes off, lower the sash and evaluate the situation before continuing work.

Department of Chemistry and Biochemistry

Calendar of Events

February

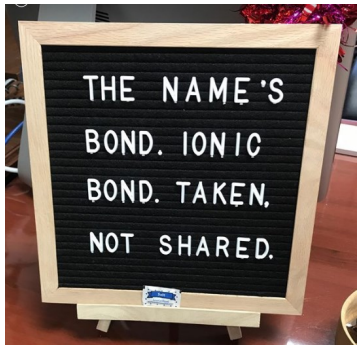
11 Seminar-Kay Brummond, Univ. of Pittsburgh, 3:30 CHEM 144
18 Seminar-Olexandr Isayev, Univ. of North Carolina, 3:30 CHEM 144
25 Seminar-Bob Griffin (Mills Lecturer), MIT, 3:30 CHEM 144
26 Seminar-Judith Herzfeld, Brandeis Univ., 3:30 CHEM 144

March

11 Seminar-Sarah Reisman (Fry Lecturer), CA Inst. Of Technology, 3:30 CHEM 144
25 Seminar-Mingyi Xie, Univ. of Florida, 3:30 CHEM 144

Our department web page is located at chemistry.uark.edu. There you will find links to departmental information, news, and people. But best of all, alumni can stay in touch through the Alumni & Friends link. We want our alumni to stay in touch! Please take a few minutes to browse the page and submit any update you'd like published (or not). We welcome pictures, too!

MAHSA'S MIRTH



2018-2019 CUME Schedule

FALL
September 7
October 5
October 26
November 16
December 7

SPRING
January 25
February 15
March 8
March 29
April 26

CHEM 144, 5:00-6:00 p.m.

The department of chemistry and biochemistry at the University of Arkansas strives for excellence in research, teaching and service in chemistry - the central science. We aspire to positions of leadership regarding the discovery of new scientific knowledge, the training of students, and the economic development of the State of Arkansas. We seek to recruit and retain a diverse group of the best faculty, students and staff to address the challenges of the future through interdisciplinary and multi-disciplinary research and education.

Library Hours

CHBC Library (CHEM 225)
http://libinfo.uark.edu/chemistry

Spring Semester Hours: January 14 - May 10

Sunday	CLOSED
Monday – Thursday	8:00am – 9:00pm
Friday	8:00am – 6:00pm
Saturday	CLOSED

Exceptions to Regular Spring Hours

Monday	January 21, MLK Holiday	CLOSED
Friday	March 15	8:00am – 5:00pm
Monday – Thursday	March 18-21, Spring Break	8:00am – 5:00pm
Friday	March 22	CLOSED
Friday	May 10	8:00am – 5:00pm

The chemistry and biochemistry library resources can be accessed in the following LibGuides: http://uark.libguides.com/content.php?pid=110953. Please bookmark for future use.
Theses and dissertation resources can be found on the following LibGuide: http://uark.libguides.com/content.php?pid=123035 &sid=1057466.
For more information: Check the Libraries' web site (http://libinfo.uark.edu) for updated information on hours and services. Library hours are also available by dialing 479-575-2557.